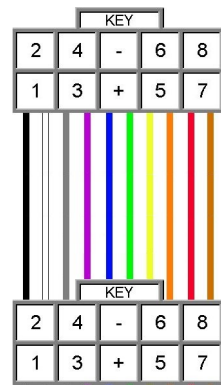


Input Connector Pin Identification

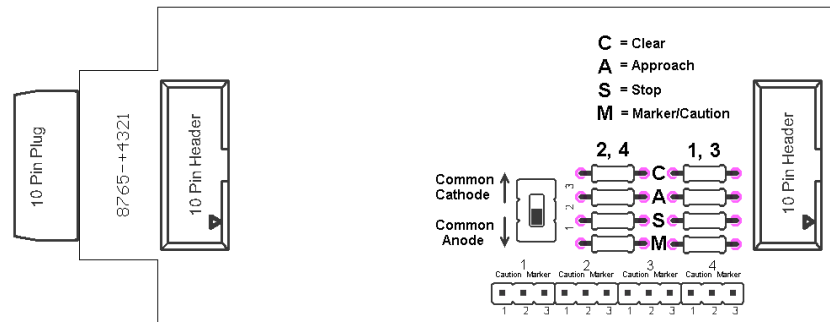
The port connector wiring is as follows.

Pin number	Connection
1	h (8)
2	g (7)
3	f (6)
4	e (5)
5	Ground
6	+5VDC
7	d (4)
8	c (3)
9	b (2)
10	a (1)



10 position IDC connector

Output Options



Current Limiting Resistors.

To increase LED brightness add resistors as indicated above. Each resistor controls the brightness of the lamps in two heads. Do not use less than 100 ohm resistors.

Control Jumpers and Polarity Switch.

Each head has a jumper selection between J1-J2 "Caution" (4th aspect), "Dark" (no jumper), and J2-J3 "Marker" (always on) for the 4th LED. To enable flashing aspects this jumper must be set to "Marker" or else removed.

The switch controls the board output polarity. Either common Anode or common Cathode LED connections may be used.

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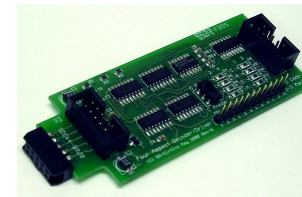
4ASD-4

4 Aspect Signal Driver - 4 Heads

User's Guide

Modular I/O Cards

All RR-CirKits Tower Controller Modular I/O cards are designed to either be plugged directly into the TC-64, or else mounted in Tyco 3-1/4" Snap-Track® mounted to the bench work and connected with short ribbon cables. (Snap-Track® is a plastic channel designed to mount PC cards to a chassis, not something to run trains on.) Each Modular I/O card is equipped with two connectors to facilitate these connection options.



4ASD-4 (4 Aspect Signal Driver - 4 head)

One of the best descriptions of CTC signalling from both a modellers and prototype perspective that I am aware of may be found at the [Control Train Components](http://www.ctcparts.com/aboutprint.htm) web site. (<http://www.ctcparts.com/aboutprint.htm>)

Power Connections

This Modular I/O board gets its power directly from the Tower Controller. It includes an on-board DC to DC converter that provides a -4V supply for the signal commons. This means that the signal LEDs have up to 9V to allow for reliable series operation of up to 3 LEDs of any color.

Do NOT use this board to drive anything other than LEDs, and do NOT connect either the LEDs nor board outputs to anything other than just each other.

Definitions

Signal arm or signal head = Each individual signal unit.

Aspect = The speed or route indication given by one or more signal heads or arms. The term "arm" comes from early semaphore signals, but may still be used for signals with just lights.

Marker = A signal head or arm that does not change color or position.

Light = The individual lamp in a signal. A light may indicate multiple aspects if it changes color like in a searchlight signal, or it may take multiple lights to indicate a single aspect, for example in position light signals.

Mast = The pole that mounts one or more signal arms that (usually) controls one individual track.

Signal Head Wiring

Single connectors are shown in these schematic drawings, but normally each signal mast will have its own connector spaced out in daisy chain configuration along a single ribbon cable coming from the driver card.

All the following circuits may be built as either common anode or common cathode versions. Simply switch the polarity selector on the driver board to match. Common anode versions are shown. To wire common cathode versions just reverse the direction of each LED.

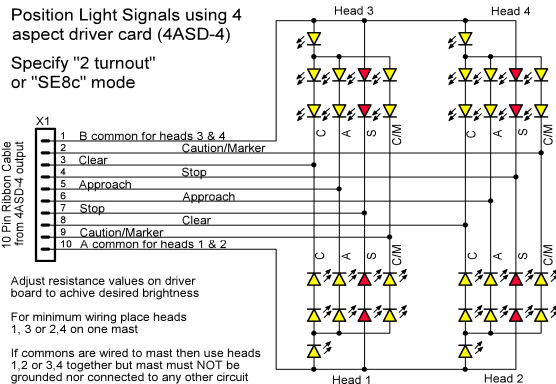
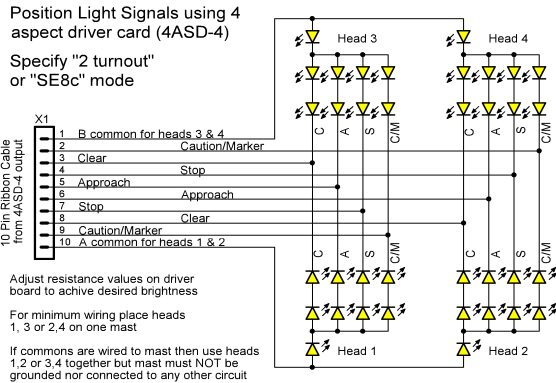
Position Light Signals

Position light signals are more difficult to drive than color light signals due to the large number of LEDs involved. The simplest wiring option is shown here. However this connection puts three yellow LEDs in series for each aspect.

Yellow LEDs require over 2 volts each to illuminate, so it is not possible to drive this simply wired head directly from a 5 volt source. To solve this problem the 4ASD-4 board includes a voltage mirror circuit that supplies approximately 9 volts to the driver circuits. This board also multiplexes the output lines and includes the current limiters on the driver board. This allows 4 heads to each be driven with 4 aspects using just 10 wires. Normally we drive 4 heads, with just 3 aspects each plus dark, on each output port. This frees the 4th aspect connections to optionally be used to illuminate fixed marker lights if so desired.

Absolute Position Light Signals

For the late era use of red lamps in some position light signals as an Absolute Stop indication use the alternate wiring as shown here. These signals were apparently modified from existing signals by simply changing out the lenses in the stop aspect and then wired to not illuminate the center lamp when stop was active.



Color Position Light Signals

Color position light signals only require 2 LEDs in series, so they may be directly driven from the outputs of a Tower Controller.

However this can be problematic using logic level outputs because of the required voltages to illuminate series LEDs properly.

To avoid potential problems with dim indications, this schematic shows them being driven with a 4ASD-4 driver card. The 4ASD-4 can drive them easily and also saves on the amount of wiring required. Color Position Lights were often used in conjunction with additional marker lights for speed indications. If your situation requires a single fixed marker indication and does not also require the lunar aspect, then it may be lighted using the marker option.

Color Light Signals

As noted above, color light signals may easily be driven directly from the outputs of a Tower Controller. This schematic shows them being driven with a 4ASD-4 driver card to save on the amount of wiring required and number of ports used.

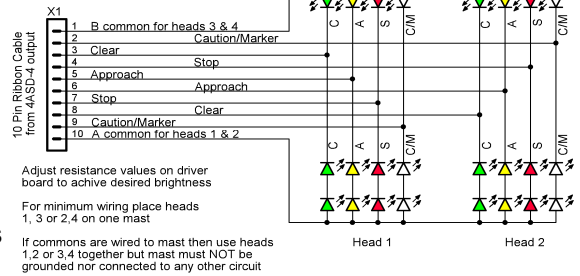
Color Light Signals are often used in conjunction with additional marker lights to indicate absolute signals. If your situation requires a single fixed marker indication and does not also require the lunar aspect, then it may be lighted using the marker option.

Connections and Options

There are two input connections and one output connection on the 4ASD-4 board. The two input connections use the standard TC-64 10 pin cable connection that is shared by all Tower Controller Modular I/O cards. Both a male and female connector is provided, and either may be used depending on your requirements.

Color Position Light Signals using 4 aspect driver card (4ASD-4)

Specify "2 turnout" or "SE8c" mode



Color Light Signals using 4 aspect driver card (4ASD-4)

Specify "2 turnout" or "SE8c" mode

